

# THREE NEW SPECIES OF *CHUSQUEA* (GRAMINEAE: BAMBUSOIDEAE)<sup>1</sup>

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## ABSTRACT

*Chusquea pohlii*, *C. latifolia*, and *C. serpens* are described from Central and South America. Observations on bud morphology and branch development in *Chusquea* are included. Bud morphology provides a new set of vegetative characters invaluable in separating species of *Chusquea*. The bud complement in *Chusquea* consists of one dominant central bud subtended by 2-numerous, smaller subsidiary buds. The number and arrangement of the buds are variable and seem to be species-specific. The bud complement of each of the new species is illustrated and described. Infravaginal branching, found in several *Chusquea* species, including those described here, is defined and contrasted with extravaginal branching, typical of the majority of species in the genus.

Among the woody bamboos, *Chusquea* Kunth has long been recognized as a large and diverse genus. McClure (1973) and Calderón and Soderstrom (1980) included over 90 species within the genus, but according to my observations the count is nearer 120 species. Early descriptions of *Chusquea* species (e.g., Nees von Esenbeck, 1835; Munro, 1868; Hackel, 1903; Pilger, 1905) focused primarily on spikelet morphology. More recently McClure (1973) and Soderstrom and Calderón (1978a, 1978b) recognized the importance of vegetative features in distinguishing among species in *Chusquea*, but interspecific variation of bud and branch complement morphology in the genus has received little detailed study. My work has shown that the bud complement provides a new set of vegetative characters invaluable in separating species, and that there is greater variability in patterns of branch development than has been previously attributed to *Chusquea*.

The bud complement in *Chusquea*, according to McClure (1973: 69), consists of "separate primary buds of two size categories in constellate insertion, the smaller ones usually many (rarely only 2)." Although this fundamental bud morphology is shared by all members of the genus, the number and arrangement of the buds are highly variable and seem to be species-specific. Two representative bud complements are illustrated in Figure 1. The sheath scar is the line of attachment of the culm leaf. The nodal region is

delimited below by the sheath scar (nodal line), and above by the supranodal ridge, which may or may not be prominent. The largest, or dominant bud is the central bud, and the smaller subtending buds are called subsidiary buds (McClure, 1973; Soderstrom & Calderón, 1978a, 1978b). In the chusqueoid bud complement, all the buds are of the same (primary) order. The term "subsidiary" is used here in the sense of McClure (1973) to indicate only that the buds so described are smaller than the central bud. As defined by Foster and Gifford (1974), subsidiary buds also could be called collateral buds. The dimorphism between the central and subsidiary buds in *Chusquea* is striking and sets this genus apart from all other bamboos.

Two types of central buds are found in *Chusquea*. The triangular type, exemplified by *C. serpulata* Kunth (Fig. 1A), is very common and like those of other bamboos. The bud is erect and roughly triangular in outline, and the winged prophyllum is easy to distinguish. The circular type of central bud, as seen in *C. liebmannii* Fournier (Fig. 1B), is more or less circular in outline, projecting outward horizontally from the culm. The prophyllum is atypical, apparently lacking wings. I have observed circular central buds in only eight or nine species of *Chusquea* and not in any other bamboo genera.

Extravaginal branching, in which the emerging branches break through the base of the culm sheath proper (Fig. 2A), is typical of *Chusquea*

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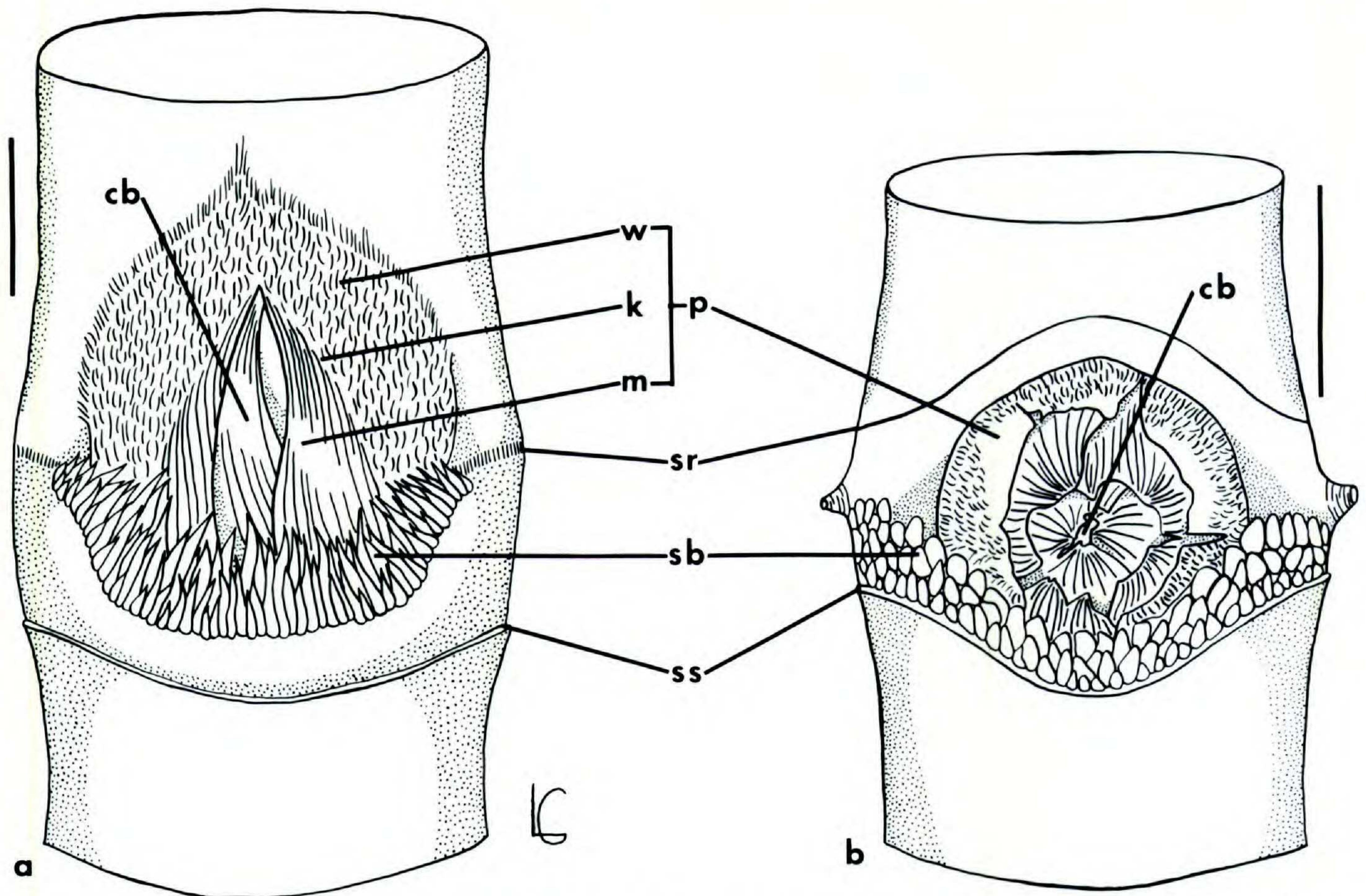


FIGURE 1. Representative bud complements of *Chusquea*.—A. *C. serrulata*, mid-culm bud complement showing triangular central bud.—B. *C. liebmannii*, mid-culm bud complement showing circular central bud. Scales = 1 cm. Cb—central bud, k—keel, m—margin, p—prophyllum, sb—subsidiary bud, sr—supranodal ridge, ss—sheath scar, w—wing.

(Soderstrom & Calderón, 1978b). The girdle, a horizontal band of elastic, usually persistent tissue at the base of the culm sheath in some bamboos (McClure, 1973), usually is not well developed in species of *Chusquea* that exhibit extravaginal branching. However, I have observed in several species of *Chusquea*, including the three species described in the present paper, that the girdle is prominent, forming a sometimes asymmetrical band of tissue up to 1.5 cm wide at the base of the culm sheath. The girdle usually is persistent, even after the culm leaf separates from it and falls away. In contrast to extravaginal branching, here the developing subsidiary branches emerge through the girdle without rupturing the culm sheath (Figs. 3F, 4E). Occasionally, as the branches mature, the culm sheath becomes ruptured to a certain extent, particularly if its overlapping edges are fused at the base (Fig. 3F). I am designating this pattern of branch development "infravaginal," a term suggested to me by Cleofé Calderón. It is clear that this type of branching is derived from the extravaginal pattern by means of the expansion of the girdle, but the distinction between extravaginal

and infravaginal branching is taxonomically useful and a parallel, descriptive term is necessary. Infravaginal branching is known in only one other bamboo genus, the Asiatic *Dinochloa* Büse (Dransfield, 1981). In both *Chusquea* and *Dinochloa*, infravaginal branching is correlated with a climbing, viny habit.

The first of the three species described here is named in honor of Dr. Richard W. Pohl of Iowa State University, who has devoted much of his career to studying the grasses of Costa Rica. It is fitting that this Costa Rican endemic commemorate Dr. Pohl's many years of field work in that country and his long-standing interest in the bamboos. Notes of the late Dr. F. A. McClure, filed in the Hitchcock and Chase Grass Library of the Smithsonian Institution (U.S. National Herbarium), show that he considered the second of these three species to be distinct, based on the presence of just two subsidiary buds subtending the central one. Because of the unusual branch complement, he tentatively proposed that this species be included in a new genus. It is evident that his notes and descriptions were at best preliminary; he used at least three different

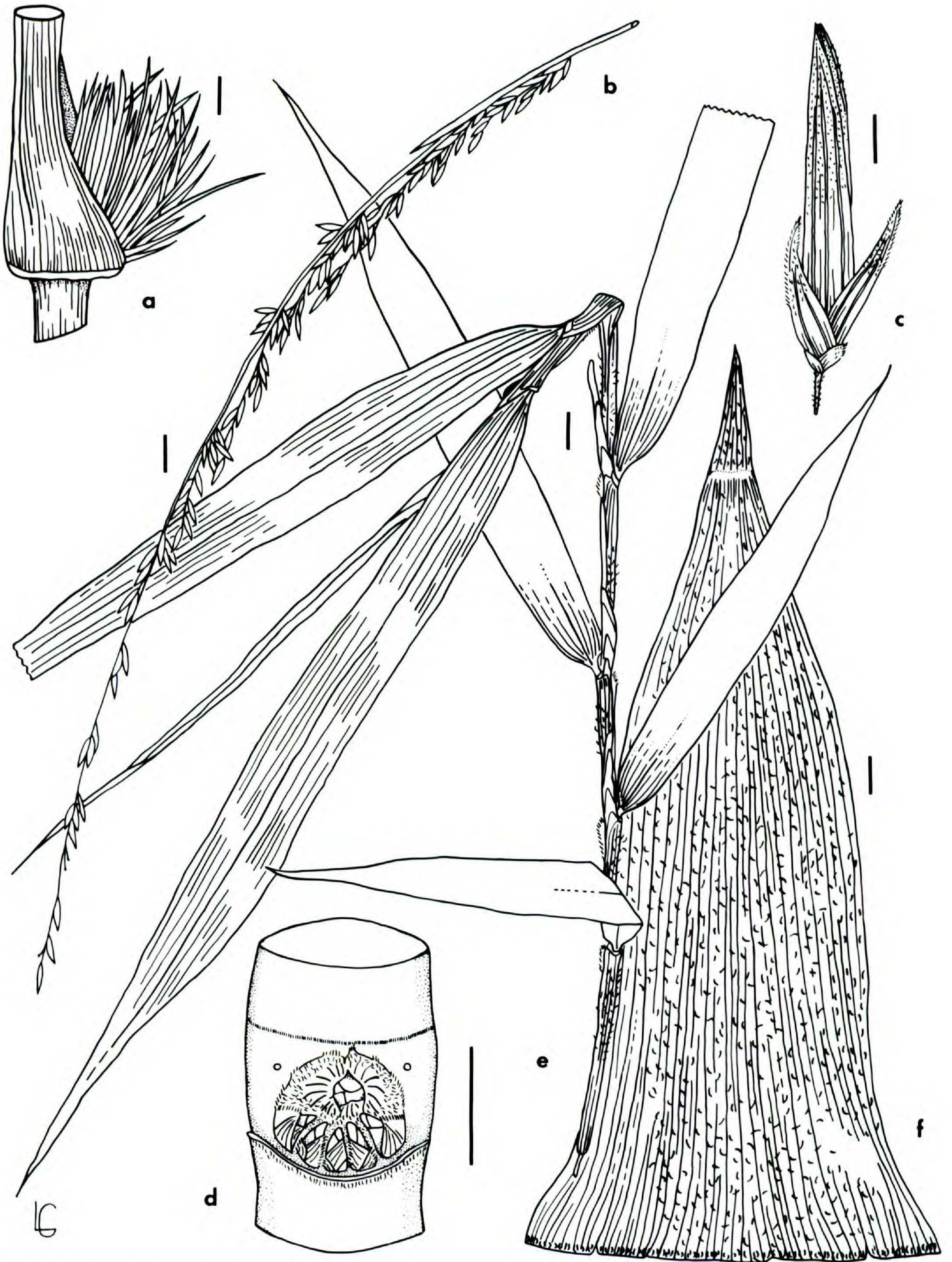


FIGURE 2.—A. Extravaginal branching in *Chusquea serrulata*, scale = 1 cm (based on Calderón *et al.* 2989). B–F. *C. pohlii*. —B. Inflorescence, scale = 1 cm.—C. Spikelet, scale = 1 mm.—D. Bud complement, scale = 1 cm.—E. Leafy branch, scale = 1 cm.—F. Culm leaf, scale = 1 cm (B–C based on Croat 36232; D–F based on Clark & Clark 275).

provisional names (of which I chose the most descriptive) for the same entity. Three agrostologists (J. R. Swallen, T. R. Soderstrom, and R. W. Pohl) recognized, apparently independently, that the third species described here was distinct, but the provisional names used would be invalid and no adequate description was ever provided.

1. *Chusquea pohlii* Clark, sp. nov. TYPE: Costa Rica. San José: along the Interamerican Hwy. between Km 44–45, closer to Km 45, 2,190 m, 27 Feb. 1982, Clark & Clark 275 (holotype, ISC; isotype, US). Figure 2B–F.

Culmi scandentes, arcuati, usque ad 3 cm diam., usque ad 15 m longi. Folia culmorum persistentia, longior quam nodus sequens extensa, 21–47.6 cm longa: vaginae triangulares, connatae basi, plerumque confertim pubescentia basi, 18.5–39.2 cm longae, 5.4–10.5 cm latae basi, vagina plerumque 5.5- vel 7.5-plo longior quam lamina, externae hispidae, internae sparsim hispidae; laminae persistentes, triangulares, apicibus acuminatis, 2.5–8.4 cm longae, scabrae; cingulum asymmetricum, prominens non nisi prope gemmam. Nodi ad culmum medium gemma centralis singularis rotundata subtenta a (2–)4–9(–12) gemmis parvioribus subaequantibus. Ramificatio infravaginalis. Folia 4–6 in complemento: vaginae hispidae; laminae lineares-lanceolatae, apicibus acuminatis, basibus attenuatis-rotundatis, 14–25.6 cm longae, 1–2.3 cm latae, scabridiusculae superne, glabrae inferne, inferne tessellatae; ligula interna elongata, asymmetrica, (7–)11–30 mm longa. Inflorescentia angusta, paniculata, 21–30 cm longa; rhachis plus minusve complanata, puberula; rami appressi, angulati, puberuli. Spiculae lanceolatae, 6.8–9 mm longae, leviter falcatae. Glumae 2: gluma I squamiformis, 0.5–0.6 mm longa, enervis; gluma II squamiformis, 0.8 mm longa, enervis. Lemmata sterilia 2: lemma sterile I triangulatum, apiculatum, 3.1–4.5 mm longum, 5-nerve; lemma sterile II lanceolatum, apiculatum, 4.1–5.1 mm longum, 5-nerve. Lemma fertile lanceolatum, apiculatum, 6.6–7.6 mm longum, 7-nerve. Palea lanceolata, bicarinata, apiculata, 6.4–7.7 mm longa, 4-nervis.

Culms scandent, to 3 cm diam., to 15 m long, arching. Internodes terete, often shallowly sulcate above the central bud on more mature culms, solid, 22–36 cm long, scabrous-hispid below node. Culm leaves persistent, usually extending past the next node, 21–47.6 cm long, chartaceous to cartilaginous; sheaths triangular, fused for 2.3 cm above the base, 18.5–39.2 cm long, 5.4–10.5 cm wide at base, usually 5.5–7.5 times, occasionally only 3–4 times, as long as the blade, abaxially hispid but hairs deciduous with age so the sheath often seems scabrous only, adaxially shiny and sparsely hispid toward the apex or sometimes the whole upper half hispid, the margins glabrous, the base often densely pubescent;

blades persistent, triangular, 2.5–8.4 cm long, abaxially scabrous, adaxially glabrous and shiny, the apex acuminate, the margins glabrous; girdle asymmetrically developed, prominent only in the region of the bud complement where the sheath scar dips markedly forming a flap through which the lowermost subsidiary branches emerge; inner ligule a short, stiff rim, 1–2 mm long; outer ligule lacking. Nodes only slightly swollen, at mid-culm with one circular central bud subtended by (2–)4–9(–12) smaller subequal subsidiary buds. Branching infravaginal, central bud rarely developing but sometimes rebranching when developed; lowermost subsidiary buds developing first and emerging through the girdle, the upper ones developing shortly thereafter and emerging through the sheath, forming leafy branches 24–39 cm long, which do not rebranch. Foliage leaves 4–6 per complement; sheaths carinate, hispid but often glabrous just below the pseudopetiole and toward the margins, the overlapping margins ciliate; blades linear-lanceolate, 14–25.6 cm long, 1–2.3 cm wide, L:W = 9:16, the adaxial surface scabrid and not tessellate, the abaxial surface glabrous and weakly tessellate, the apex acuminate, the margins serrulate, the base attenuate-rounded; pseudopetiole more or less distinct, 2–5 mm long; outer ligule a conspicuous, stiff rim 0.5–2 mm long; inner ligule elongate, asymmetrical, (7–)11–30 mm long, chartaceous. Inflorescence a narrow panicle 21–30 cm long; rachis puberulent, one side slightly rounded, the other ridged; branches appressed, arising only from the ridged side of the rachis, angular, 5–6 cm long at the base of the panicle, puberulent; pedicels 1–4 mm long, angular, pubescent. Spikelets lanceolate, 6.8–9 mm long, slightly falcate. Glumes 2; glume I scale-like, 0.5–0.6 mm long, glabrous, nerves lacking; glume II scale-like, 0.8 mm long, apically obtuse, abaxially pubescent, nerves lacking. Sterile lemmas 2; sterile lemma I triangular, 3.1–4.5 mm long, apiculate, abaxially pubescent on the upper half, adaxially pubescent just below the apex, marginally ciliate toward apex, 5-nerved; sterile lemma II lanceolate, 4.1–5.1 mm long, apiculate, abaxially pubescent on the upper half, adaxially pubescent just below apex, marginally ciliate toward apex, 5-nerved. Fertile lemma lanceolate, 6.6–7.6 mm long, apiculate, abaxially scabrous-pubescent on the upper half, adaxially pubescent just below apex, marginally ciliate toward apex, 7-nerved. Palea lanceolate, 2-keeled, sulcate only toward the apex, 6.4–7.7 mm long, apiculate, abaxially scabrous-pubes-

cent between the keels, otherwise scabrid toward apex, 4-nerved. *Lodicules* 3; 1.5–1.9 mm long, the posterior lodicule narrower than the anterior ones, all ciliolate on the upper margins. *Stamens* 3; anthers linear, 3.3–3.9 mm long. *Ovary* glabrous. *Fruit* unknown.

*Representative specimens examined.* COSTA RICA. ALAJUELA: Km 15–16, N of San Ramón, *Pohl & Clark 14115* (CR, ISC). CARTAGO: Tapantí Hydroelectric Reserve trail along Río Dos Amigos, 23 June 1976 (fl), *Croat 36232* (MO, US); Alto Patillos, NE of Tapantí, along road to Turrialba, *Pohl 14139* (CR, ISC); at hydroelectric dam, canyon of Río Grande de Orosi, S of Tapantí, *Pohl & Selva 12886* (ISC, MO). HEREDIA: Volcano Barba, wet submontane forest, at end of road, *Booth 161* (US); Route 9, S of the Vara Blanca intersection, between Km 28 & 29, *Clark & Clark 277* (ISC, US); Alto del Roble, Río Las Vueltas, ca. 10 km NNE of Heredia, *Pohl & Gabel 13676* (ISC). PUNTARENAS: Monteverde, along forest road in forest preserve, *Pohl & Pinette 13246* (F, ISC, MO). SAN JOSÉ: along road N of Cascajal, N of Río Cascajal, *Pohl 14101* (CR, ISC); Parque Nacional Braulio Carillo, S boundary, 2 km S of Bajo de Hondura, *Pohl & Clark 14104* (CR, ISC).

This bamboo has solid culms and multiple independent buds at each node, thus placing it in *Chusquea*, where it is distinct enough to merit specific recognition. Pohl (1980, 1983) has referred to this species as the "Tapantí population" of *Chusquea* and *Chusquea* "*hispidissima*," respectively. *Chusquea pohlii* is distinguished by its rather thick, coarse, clambering culms, hispid culm and foliage leaf sheaths, subsidiary branches that do not rebranch, long ligules, and spikelets with the sterile lemmas extending approximately one-half the spikelet length. This species has been collected only in the cloud forests of Costa Rica at elevations of 1,500 to 2,600 m, where it can form large colonies in disturbed areas.

The peculiar bud complement of this species is one of its most distinctive features. The central bud is circular in outline rather than triangular (Fig. 2E), and when it develops, the resulting branch initially diverges nearly 90° from the main culm. Usually four to nine smaller subsidiary buds subtend the central bud. As the subsidiary branches develop, they too diverge strongly, becoming geniculate and bending outward, away from the central bud.

2. *Chusquea latifolia* Clark, sp. nov. TYPE: Colombia. Tolima: El Libano a Murillo (Km 11 al 22 de la carretera), subpáramo en el Alto de Peñones, 2,200–2,950 m, 20 July 1947 (fl), *García-Barriga 11259* (holotype, US; isotype, COL). Figure 3.

Culmi scandentes, usque ad 1.5 cm diam., usque ad 40 m longi. Folia culmorum pro longitudine internodia extensa, 17.8–30 cm longa, pubescentia ad juncturam vaginae et laminae: vaginae persistentes, triangulares, connatae basi, 15.2–26.5 cm longae, usque ad 8.5 cm latae basi, multo longior quam lamina, scabrae vel interdum pubescentes; laminae deciduae, triangulares, apicibus acuminatis, 1.1–3.5 cm longae, externae scabrae vel interdum glabrae, internae pubescentes; cingulum prominens, usque ad 1.5 cm longum, pubescens. Nodi ad culmum medium gemma centralis singularis triangularis subtenta a 2 gemmis parvioribus subaequantibus. Ramificatio infravaginalis. Folia 5–9 in complemento: laminae lanceolatae, apicibus acuminatis, basibus rotundatis vel rotundatis-truncatis, 13.3–32.1 cm longae, 3–8.5 cm latae, glabrae superne, glabrae inferne, inferne tessellatae; ligula interna plerumque conspicua, rotundata vel truncata, (1–)2–15 mm longa, plerumque pubescens. Inflorescentia angusta, paniculata, 20.5–42.5 cm longa; rhachis complanata, glabra; rami appressi, secundi, angulati, glabri. Spiculae ovatae-lanceolatae, 8.2–12 mm longae, leviter falcatae. Glumae 2: gluma I triangulata, apice rotundatis, 0.5–1.3 mm longa, enervis; gluma II ovata-lanceolata, apiculata, 2.4–2.5 mm longa, 3- vel 5-nervis. Lemmata sterilia 2: lemma sterile I ovatum-lanceolatum, apiculatum, 3.2–4.2 mm longum, 7- vel 9-nerve; lemma sterile II ovatum-lanceolatum, apiculatum, 4.4–6.5 mm longum, 7-nerve. Lemma fertile ovatum-lanceolatum, naviculare, apiculatum, 8–10.6 mm longum, 9- vel 11-nerve. Palea ovata-lanceolata, bicarinata, sulcata, non apiculata, 8.3–9.6 mm longa, 6- vel 8-nervis.

*Rhizomes* leptomorph. *Culms* viny, scandent, to 1.5 cm diam., to 40 m long, often trailing for part of the length. *Internodes* terete to slightly laterally compressed, solid, 25–39 cm long, glabrous to scabrous or pubescent just below the nodes. *Culm leaves* extending almost the length of the internode, 17.8–30 cm long, pubescent at the juncture of the sheath and blade, chartaceous; sheaths persistent, triangular, fused to 2.5 cm above the base, 15.2–26.5 cm long, to 8.5 cm wide at the base, at least 9 times as long as blade, scabrous or sometimes pubescent; the margins ciliate near the apex; blades deciduous, triangular, 1.1–3.5 cm long, abaxially scabrous or sometimes glabrous, adaxially pubescent, the apex acuminate, the margins ciliate; girdle usually well developed, to 1.5 cm wide, pubescent, forming a flap through which the branches emerge, often disintegrating before the rest of the culm leaf; inner ligule a short, ciliolate rim; outer ligule lacking. *Nodes* only slightly swollen, at midculm with one triangular central bud subtended by two smaller subequal buds. *Branching* infravaginal, central bud sometimes developing into a robust branch more or less equal in size to the main culm and rebranching; subsidiary buds 2, developing into leafy branches 17–66 cm long

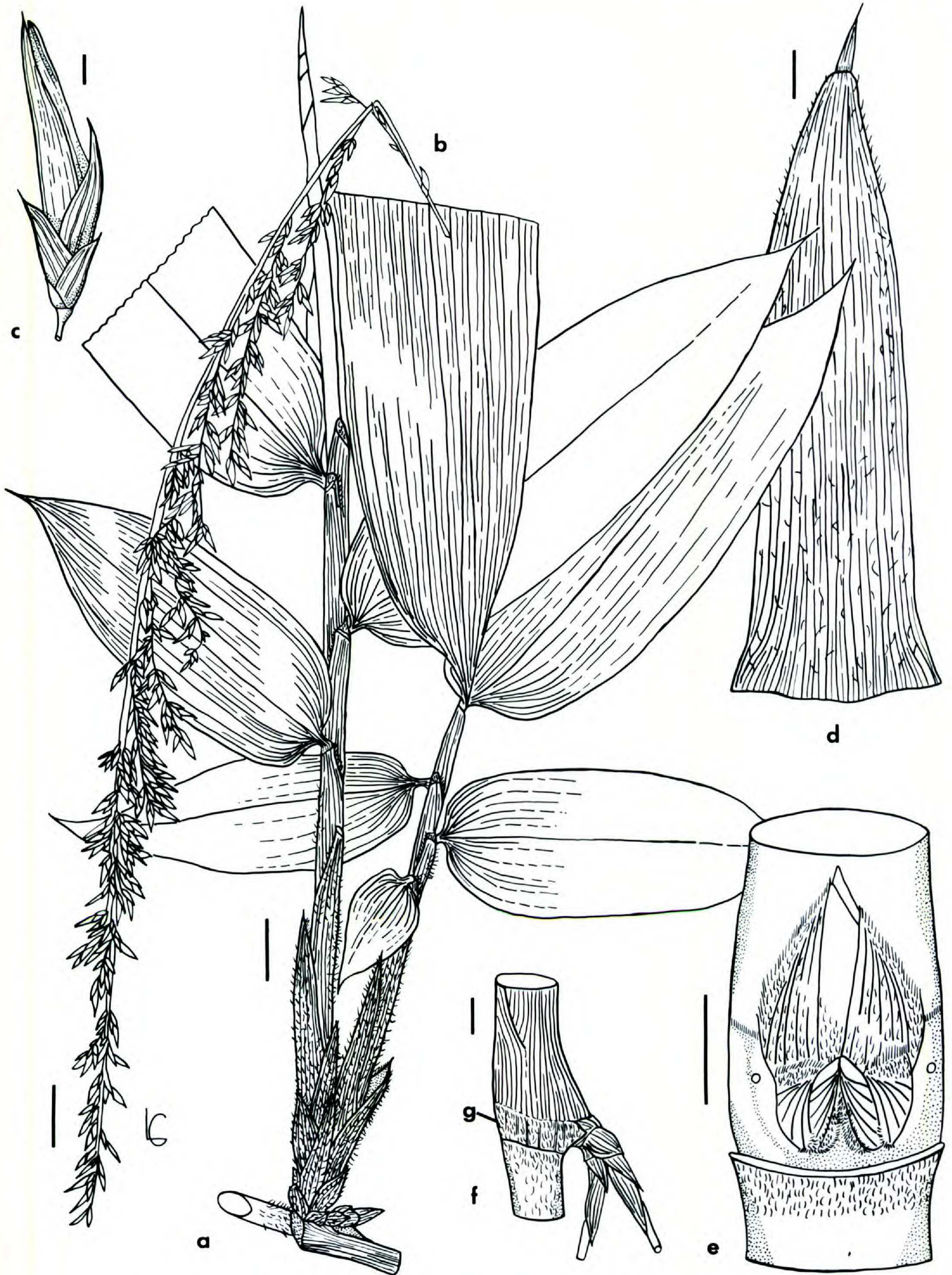


FIGURE 3. *Chusquea latifolia*.—A. Leafy branch complement, scale = 2 cm (based on Killip & García 33904).—B. Inflorescence, scale = 2 cm.—C. Spikelet, scale = 1 mm (B, C based on García-Barriga 12259).—D. Culm leaf, scale = 2 cm.—E. Bud complement, scale = 1 cm (D, E based on Calderón 2997).—F. Node with branches emerging infravaginally (base of sheath with fused margins), scale = 1 cm (based on McClure 21748).—G. girdle.

that rebranch extensively from their lower nodes. *Foliage leaves* 5–9 per complement; sheaths carinate, usually pubescent, especially along the keel, occasionally glabrous, the margins usually glabrous or occasionally sparsely ciliate; blades lanceolate to broadly lanceolate, 13.3–32.1 cm long, 3–8.5 cm wide, L:W = 3.5:6, the adaxial surface glabrous, not tessellate, the abaxial surface glabrous, weakly tessellate, the apex acuminate, the margins cartilaginous, serrulate, the base rounded to rounded-truncate; pseudopetiole distinct, 3–9 mm long; outer ligule a conspicuous, stiff rim 0.5–2 mm long; inner ligule usually conspicuous, rounded to truncate, (1–)2–15 mm long, usually abaxially pubescent at least on the lower half, chartaceous. *Inflorescence* a narrow panicle 20.5–42.5 cm long; rachis glabrous, one side flat and slightly ridged, the other rounded; branches appressed, secund, arising only from the flat, slightly ridged side of the rachis, angular, 3–9 cm long at the base of the panicle, becoming progressively shorter toward the apex with the spikelets eventually arising directly from the rachis, glabrous; pedicels short. *Spikelets* ovate-lanceolate, 8.2–12 mm long, slightly falcate. *Glumes* 2; glume I triangular, 0.5–1.3 mm long, apically rounded, glabrous, lacking nerves; glume II ovate-lanceolate, 2.4–2.5 mm long, apiculate, abaxially glabrous, adaxially sparsely pubescent near the apex, 3- or 5-nerved. *Sterile lemmas* 2; sterile lemma I ovate-lanceolate, 3.2–4.2 mm long, apiculate, abaxially glabrous, adaxially pubescent below the apex, 7- or 9-nerved; sterile lemma II ovate-lanceolate, 4.4–6.5 mm long, apiculate, abaxially glabrous, adaxially pubescent just below the apex, 7-nerved. *Fertile lemma* ovate-lanceolate, shiny, 8–10.6 mm long, apiculate, glabrous, 9- or 11-nerved. *Palea* ovate-lanceolate, 2-keeled, sulcate, shiny, 8.3–9.6 mm long, glabrous, 6- or 8-nerved, the apex acute but not apiculate. *Lodicules* 3; anterior pair 2.5–2.7 mm long, the upper margins ciliate; posterior lodicule 1.6 mm long, narrower than the anterior, ciliate on the upper margin. *Stamens* 3; anthers linear, 4.5–5.2 mm long. *Ovary* glabrous, with 2 styles bearing plumose stigmas. *Fruit* unknown.

*Representative specimens examined.* COLOMBIA. ANTIOQUIA: en selvas densas y húmedas en las montañas al oeste de Sonsón, *Johnson & Barkley 18C822* (COL). RISARALDA-QUINDIO: Río Barbas, *McClure 21748* (ISC, US). VALLE: old Cali–Buenaventura road, 17 km NW from Cali, Villa Monica–El Rancho de Yo, *Calderón 2997* (COL, ISC, US); Cordillera Occidental, vertiente oriental, hoyo del río Cali, vertiente derecha confluencia del río Pichindécito con el Pichindé, 7 Nov.

1944 (fl), *Cuatrecasas 18767* (US); Cordillera Occidental, vertiente oriental, hoyo del río Cali, río Pichindé, en Los Carpatos, *Cuatrecasas 21629* (US); San Antonio, W of Cali, near summit of Cordillera Occidental, *Killip & García 33904* (US); along Cali–Buenaventura Hwy. on E slope of Cordillera Occidental, *McClure 21234* (ISC, US).

This species is characterized by its large, wide leaves, rebranching subsidiary branches, scabrous sheath with a relatively small blade, and somewhat falcate spikelets with apiculate (but not distinctly awned) lemmas. Known only from Colombia, *Chusquea latifolia* generally inhabits cloud forests and ranges from 1,600 to 2,700 m elevation, although it may be found as high as 2,950 m in subparamo vegetation. The vine forms an extensive network, which clambers over trees and other vegetation. Frequently portions of the culm will run for several meters over the ground, eventually turning downward and entering the soil to re-emerge as another culm some distance away.

The bud complement of *C. latifolia* is unusual, consisting of one triangular central bud subtended by two (sometimes three) smaller, subequal subsidiary buds that begin to proliferate early (Fig. 3E). The central bud frequently does not develop, but the subsidiary buds develop and rebranch vigorously, often producing mature branch complements of up to 12 branches. Nodes of the main culm contain one root primordium on each side of the central bud (or branch). The nodal region of the culm is well marked, this band of tissue usually appearing slightly darker in color and being rugose in texture. The rhizomatous segments of the culm may be distinguished by their lack of such differentiation in the nodal region.

3. *Chusquea serpens* Clark, sp. nov. TYPE: Costa Rica. Alajuela: edge of Valley of Río Cariblanco, Cariblanco, 830 m, 26 Aug. 1968 (fl), *Pohl & Davidse 11023* (holotype, ISC; isotype, US). Figure 4.

Culmi scandentes, usque ad 1 cm diam., usque ad 20 m longi. Folia culmorum non persistentia, usque ad media internodia, 10–20.1 cm longa: vaginae rectangulares, latus factus basi, 6.7–11.3 cm longae, 2.5–4 cm lati basi, glabrae vel verrucosae trichomatibus rigidis, sparsis usque ad densis; laminae plus minusve cordatae, apicibus setosis, 3–8.4 cm longae, non longior quam vagina, glabrae; cingulum plus minusve prominens, usque ad 5 mm longum, confertim pubescens. Nodi ad culmum medium gemma centralis singularis triangularis subtenta a 2 gemmis parvioribus subaequantibus. Ramificatio infravaginalis. Folia 3–7 in

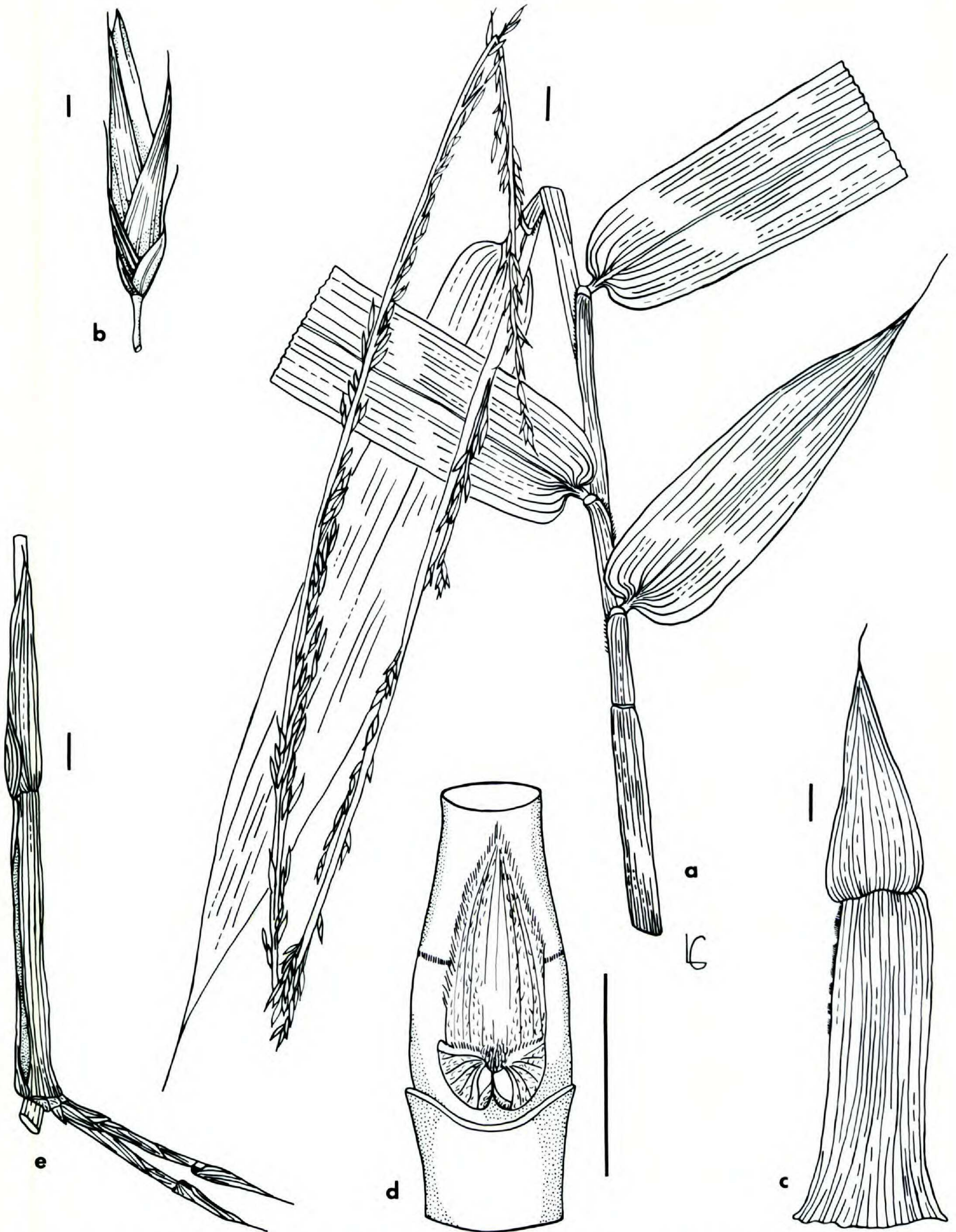


FIGURE 4. *Chusquea serpens*.—A. Flowering branch, scale = 1 cm (based on Pohl & Davidse 11023).—B. Spikelet, scale = 1 mm (based on Pohl & Davidse 11176).—C. Culm leaf, scale = 1 cm (based on Young 101).—D. Bud complement, scale = 1 cm.—E. Node with branches emerging infravaginally, scale = 1 cm (D, E based on Clark 283).



complemento: vaginae plerumque glabrae; laminae lineares-lanceolatae vel lanceolatae apicibus setosis, basibus rotundatis-truncatis, 11.7–35.8 cm longae, 1.8–5.1 cm latae, glabrae superne, plerumque glabrae inferne, pilosae solum ad apicem vel omnino pilosae, non tessellatae vel inferne ita; ligula interna truncata, 1–2(–2.5) mm longa. Inflorescentia angusta, paniculata, 33–55(–60) cm longa; rhachis complanata, glabra; rami appressi, secundi, angulati, glabri vel pilosi. Spiculae ovatae-lanceolatae, 11.3–14.6 mm longae. Glumae 2: glume I triangulata vel lanceolata, apice rotundatis, 1.2–2.5 mm longa, 1-nervis; gluma II ovata-triangularis, longa-aristata, 3.5–7 mm longa, 1- vel 3-nervis. Lemmata sterilia 2: lemma sterile I ovatum-lanceolatum, aristatum, 5.4–8.6 mm longum, (5–)7(–9)-nervis; lemma sterile II ovatum-lanceolatum, carinatum, brevi-aristatum, 7.7–9.9 mm longum, (5–)7–9- vel 11-nervis. Lemma fertile ovatum-lanceolatum, naviculare, aristatum, 10.6–13.2 mm longum, 7–18-nervis obscure. Palea ovata-lanceolata, apice bicarinata, sulcata, apiculata, 10.1–11.5 mm longa, 2–4(–6–8)-nervis.

*Rhizomes* leptomorph. *Culms* viny, scandent, to 1 cm diam., to 20 m long, often trailing for part of the length. *Internodes* terete but often shallowly sulcate above the primary bud, solid, to 39 cm long, retrorsely scabrous for most of their length, glabrous just above the node, green to green-mottled with purple. *Culm leaves* not persistent, extending about halfway up the internode, 10–20.1 cm long, chartaceous; sheaths more or less rectangular but flaring slightly at the base, loosely wrapped around the culm, 6.7–11.3 cm long, 2.5–4 cm wide at the base, usually about 1.5 times as long as the blade, occasionally equalling the blade, or to twice as long as blade, glabrous to verrucose with sometimes numerous rigid hairs, the overlapping margin ciliate; blades usually deciduous before sheaths separate from the culm, moderately to distinctly cordate, 3–8.4 cm long, not longer than the sheath, glabrous, the apex setose, the margins smooth to ciliate in some specimens; girdle more or less prominent, to 5 mm wide, densely pubescent, forming a flap through which the branches emerge, disintegrating before the rest of the culm leaf; inner ligule a short, ciliolate rim; outer ligule lacking. *Nodes* only slightly swollen, at mid-culm with one triangular central bud subtended by two smaller subequal buds. *Branching* infravaginal, central bud often developing into a robust branch more or less equal in size to the main culm, this branch rebranching extensively, forming a long clambering network; subsidiary buds 2, developing into leafy branches 15–35 cm long that rarely rebranch. *Foliage leaves* 3–7 per complement; sheaths carinate, usually glabrous, occasionally

scabrous or pubescent near the margins and/or apex, the overlapping margin ciliate; blades linear-lanceolate to lanceolate, 11.7–35.8 cm long, 1.8–5.1 cm wide, L:W = 5:9, the adaxial surface glabrous, not tessellate, the abaxial surface mostly glabrous and pilose only near the apex to entirely pilose, not tessellate to weakly so, the apex tapering into a long bristle-like tip, the margins cartilaginous, serrulate, the base rounded-truncate; pseudopetiole distinct, 3–12 mm long; outer ligule a conspicuous, stiff rim 0.5–1.5(–2.5) mm long; inner ligule truncate, 1–2(–2.5) mm long, chartaceous. *Inflorescence* a narrow panicle 33–55(–60) cm long, terminating either a primary or subsidiary branch; rachis glabrous, one side flat and slightly ridged, the other rounded; branches appressed, secund, arising only from the flat, slightly ridged side of the rachis, angular, 5–9 cm long at the base of the panicle, becoming progressively shorter toward the apex with the spikelets eventually arising directly from the rachis, glabrous or pilose; pedicels short. *Spikelets* ovate-lanceolate, 11.3–14.6 mm long. *Glumes* 2; glume I somewhat variable, triangular to lanceolate, 1.2–2.5 mm long, apically broadly acute, glabrous, 1-nerved; glume II ovate-triangular, 3.5–7 mm long, long-awned, glabrous to slightly pubescent adaxially just below the apex, 1- or 3-nerved. *Sterile lemmas* 2; sterile lemma I ovate-lanceolate, 5.4–8.6 mm long, awned, glabrous to densely pubescent adaxially, (5–)7(–9)-nerved; sterile lemma II ovate-lanceolate, keeled, 7.7–9.9 mm long, awned, glabrous to densely pubescent adaxially for the upper one-half to two-thirds of its length, (5–)7–9- or 11-nerved. *Fertile lemma* ovate-lanceolate, boat-shaped, shiny, 10.6–13.2 mm long, short-awned, glabrous to densely pubescent adaxially for the upper one-half of its length, usually obscurely 7–18-nerved. *Palea* ovate-lanceolate, 2-keeled, sulcate, shiny, 10.1–11.5 mm long, apiculate, marginally ciliate toward apex, glabrous, 2–4(–6–8)-nerved. *Lodicules* 3; anterior pair 2–2.5 mm long, the upper margins ciliate; posterior lodicule 2.5–3 mm long, narrower than the anterior, ciliate on the upper margins. *Stamens* 3; anthers linear, 5.5–7.5 mm long. *Ovary* glabrous, with 2 styles bearing plumose stigmas. *Fruit* unknown.

*Representative specimens examined.* COLOMBIA. CAQUETÁ: Cordillera Oriental, vertiente oriental, Sucre, 4 Apr. 1940 (fl), *Cuatrecasas 9068* (COL, F, US). HUILA: Río Ambicá, near Quebrada San Pedro, 18 km SE of Colombia, 24 Dec. 1942 (fl), *Fosberg & Holdridge 19568* (US). META: Las Lagartijas, plateau between Río

Papamene and Río Duda, Colombia—Uribe trail, 8–9 km SW of Uribe, 22 Dec. 1942 (fl), *Fosberg 19504* (US). COSTA RICA. ALAJUELA: Cariblanco, across bridge N of village, along Río Cariblanco, *Clark et al. 283* (ISC); Cataratas de San Ramón, *Ocampo 1326* (CR, ISC, US); edge of valley of Río Cariblanco, Cariblanco, 29 Sept. 1968 (fl), *Pohl & Davidse 11176* (ISC). SAN JOSÉ: Tinamastes, 13 km SW of San Isidro de El General on road to Dominical, *Pohl 14187* (ISC). ECUADOR. NAPO: 5 km E of the town of Reventador on the road to Lumbaqui, *Young 101* (US). PANAMA. BOCAS DEL TORO: between Buenavista coffee finca and Cerro Pilón, on Chiriquí trail, cloud forest, 17 Apr. 1968 (fl), *Kirkbride & Duke 692* (MO). CHIRIQUÍ: vicinity of Gualaca ca. 8.5 mi. from Planes de Hornito, La Fortuna on road to damsite, *Antonio 5089* (MO, US). PANAMA/COLOMBIA. DARIÉN/CHOCÓ: Alto de Nique, southernmost peak of Cerro Pirre massif, *Gentry et al. 28692* (US). VENEZUELA. LARA: Dto. Morán, road between Guarico and Villa Nueva, going toward Villa Nueva a little past the hill at 1,640 m, Oct. 1978 (fl), *Burandt VO457* (MO); Parque Nacional Yacambú, ca. 6–10 km from main entrance, at a picnic area, *Clark et al. 231* (ISC); Guarico, San Isidro, 22 Sept. 1942 (fl), *Tamayo 2476* (VEN). MÉRIDA: rich damp forest along NW- and W-facing slopes of Quebrada de Montaña, in La Montaña de Los Torritos, tributary to Río Canaguá, above Finca La Montaña, 8 km SW of Canaguá, *Steyermark 56392* (US).

*Chusquea serpens* is characterized by its viny, stoloniferous habit, branch complement with only two subsidiary branches, cordate culm leaf blade almost equal to the sheath in length, secund inflorescence, and awned spikelets. *Chusquea serpens* and *C. latifolia* are similar in many respects, particularly in their clambering habit, bud complement of one triangular central bud subtended by two subsidiary buds, and large, secund inflorescences (not so marked in *C. latifolia*). Both species clearly fall within *Chusquea* because of their solid culms, multiple independent buds, and typical one-flowered spikelets but may form a natural group within the genus based on the unusual nature of the bud complement. *Chusquea serpens* can be distinguished from *C. latifolia* by its generally less robust appearance, relatively larger, cordate culm leaf blade, and awned spikelets. *Chusquea serpens* has appeared previously in the literature as the “Cariblanco population” of *Chusquea* and *Chusquea* “cariblanco” (Pohl, 1980, 1983).

*Chusquea lanceolata* Hitchcock from Guatemala and Mexico, closely related to *C. serpens*, differs in its relatively smaller culm leaf blades, more open inflorescences, and spikelets with

apiculate, not awned, lemmas. The two species are very similar with respect to their clambering habit, branch complement, and large leaves. *Chusquea lanceolata* tends to occur at somewhat higher elevations than *C. serpens*, although still in the montane forest zone.

*Chusquea serpens* is the only species of *Chusquea* known to occur in both Central and South America, extending from Costa Rica to Venezuela and along the Andes to Ecuador. It is found in cloud forests throughout its distribution, ranging in elevation from 800 to 2,100 m. Typically the plant forms large, tangled networks that festoon the surrounding vegetation. In contrast to *C. latifolia*, the central branches in *C. serpens* rebranch to produce the long, trailing and hanging culms.

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